

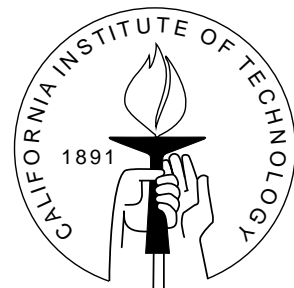
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THE “REASONABLE MAN” AND OTHER LEGAL STANDARDS.

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Abstract

In the common law of negligence, an individual breaches the duty of due care if she fails to act as would a “reasonable man” under the circumstances. A natural question, first posed by Rubinstein [8], is whether the “reasonable man” can be derived from the views of actual agents. Rubinstein introduced an axiomatic model and showed that there does not exist a non-dictatorial aggregation method which satisfies several normatively appealing properties. I introduce a new model based on a different understanding of the “reasonable man” and provide a characterization of the “union rule”, the most inclusive view of reasonableness satisfying a basic Pareto criterion. The union rule requires that a jury must unanimously agree to find a defendant liable for negligence.

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1 Introduction

In the common law of negligence, an individual breaches the duty of due care if she fails to act as would a “reasonable man” under the circumstances. A natural question, first posed by Rubinstein [8], is whether the “reasonable man” can be derived from the views of actual agents. Rubinstein introduced an axiomatic model and showed that there does not exist a non-dictatorial aggregation method which satisfies several normatively appealing properties. I introduce a new model based on a different understanding of the “reasonable man” and provide a characterization of the “union rule”, the most inclusive view of reasonableness satisfying a basic Pareto criterion. The union rule requires that a jury must unanimously agree to find a defendant liable for negligence.

There are two main competing theories of the “reasonable man” requirement in negligence law. The *economic view* holds that an individual breaches her duty if she takes less than the socially optimal amount of precaution. This approach is most commonly traced back to the opinion of Judge Learned Hand in the seminal case of *United States v. Carroll Towing*, and is consequently referred to as the “Hand Rule”. The *traditional view* holds that an individual breaches her duty if she fails to obey certain norms of reasonable behavior.

The “Hand Rule” approach has been resoundingly accepted by law and economics movement. It has the nice feature that it is efficient in theory — social welfare will be maximized if potential tortfeasors treat the costs they impose on others as costs to themselves. However, the theory, as adduced in *Carroll Towing*, measures social welfare by aggregating the dollar values of resources involved in the decision, an idiosyncratic notion of social welfare. In a more general framework, social welfare is an aggregation of individual preference, and there are many aggregation methods which could be used. None

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is an obvious choice. Arrow [1] showed that no non-dictatorial social welfare function satisfies a set of very reasonable axioms.

I have found only a single attempt to formally model the “reasonable man” in a social choice framework. Rubinstein [8] developed a model in which the “reasonable man” is formed by aggregating “realization functions”, or expectations as to the outcomes of specific actions, and preferences over outcomes held by individuals in the society. Rubinstein required that the “reasonable man” be formed through independent aggregation of realization functions and preferences and that the “reasonable man” preserve unanimous agreements with respect to (a) realization of specific actions and (b) induced preferences over actions, and showed that no non-dictatorial aggregation method satisfies these requirements.¹

The traditional approach — concerned with norms of reasonable behavior — is not directly concerned with efficiency and thus is much more difficult for economists to evaluate. The appeal of this approach is primarily in that it conforms with certain common sense notions of reasonableness.² To study this approach, I introduce a model in which the “reasonable man” is the aggregate of several individuals’ norms of reasonable behavior.

In this model, reasonableness is a characteristic of *reactions*, or actions taken upon receipt of observable signals. Each individual has an opinion as to which reactions are reasonable. The model restricts the set of admissible opinions only in that, for each signal, every individual must believe that some actions are reasonable.³ (If no actions are reasonable then we are dealing not with negligence but rather with strict liability, a standard under which reasonableness is not a defense.) These opinions are then aggregated according to some rule.

I introduce four standard axioms. *Pareto* requires that the “reasonable man” preserve unanimous agreements that particular reactions are not reasonable. *Monotonicity* requires that, if an individual changes his mind and decides that additional reactions are reasonable, then reactions previously thought reasonable by the “reasonable man” are still reasonable. *Anonymity* requires that each individual’s opinion be given equal weights. *Neutrality* requires that the aggregation not be conditioned on the names given to the actions.

There is exactly one rule which satisfies these four axioms. This is the “union rule”,

¹Both Arrow [1] and Rubinstein [8] assume a reasonably rich domain of admissible preferences. If the domain is restricted these results do not necessarily hold. Law and economics researchers often restrict their analyses to environments where preferences are quasi-linear with respect to money. The extent to which their results are applicable in broader environments is a matter of debate and probably varies across contexts.

²In contrast, the “Hand Rule” requires the “reasonable man” to maximize social welfare at the expense of her own. Law and economics scholars generally assume that individuals would not behave in this manner when they have the ability to externalize costs were it not for the threat of damages.

³As explained below, the technical requirement is that, for each signal, the set of actions must be of positive measure.

in which a response is deemed reasonable if at least one agent considers it reasonable. In the case of negligence, the union rule requires a jury to unanimously agree to find a defendant liable. This corresponds to the unanimous jury rule, used in much of the United States.⁴

1.1 Other Legal Standards

The model introduced in this paper is applicable to a broader set of problems than understanding the “reasonable man” of negligence. The “reasonable man” is found in many places in the common law, such in the law of intentional torts, where an unwanted touching is a *battery* only if it would be deemed offensive by the “reasonable man”, and in criminal law, where a homicide is excused on the grounds of self-defense if the defendant had a reasonable fear of imminent death or severe bodily harm.

The “reasonable man” is the most prominent of several standards of behavior found in the common law. Other standards include the stricter “fiduciary duty” and the more lenient “business judgement rule”.

In each of these cases there is a range of activity which meets the standard. Each person has an opinion as to the set of actions included in that range. The opinions would change if we were to consider a different standard of behavior. The formal structure of the model, however, would remain intact. The axioms presented are equally desirable regardless of the standard under consideration. Thus the argument presented for using the union rule to aggregate the “reasonable man” also applies to using the union rule to aggregate opinions regarding, for example, fiduciary duties.

1.2 Reasonableness as a matter of law.

The law distinguishes between reasonableness “as a matter of fact” and “as a matter of law”. Decisions about the former are usually made by a jury and do not create precedents for future cases, while decisions about the latter are made by judges and are valid precedents for future cases. This paper is primarily concerned with understanding reasonableness (or other standards) as a matter of fact. The model reflects the idea that juries are required to provide a collective judgement about facts, but are not expected to provide a logical defense of their decisions.

Judges, unlike juries, are expected to logically defend their decisions on matters of law. The problem of aggregating judgements in multi-member courts was first raised

⁴In civil cases, the unanimity rule is used in Federal courts, in the District of Columbia, and in twenty-seven states out of fifty. In criminal cases, the unanimity rule is used everywhere but Puerto Rico. The correspondence is not perfect, however. The rule generally requires that a jury must unanimously agree to find for either the plaintiff or the defendant. The extent to which mistrials are a victory for the defense is a matter of debate.

by Kornhauser and Sager [5], who demonstrated that the use of majority rule may lead to incoherent legal judgements. Their insight has since been generalized into the wider problem of “judgement aggregation,” which has focused on the extent to which opinions about the elements of a law can be aggregated consistently with the conclusions derived from those opinions. The first formal impossibility result is due to List and Pettit [6], who showed that, in general, there is no anonymous consistent aggregation method. For characterizations of non-dictatorial consistent aggregation methods, see work by Nehring and Puppe [7] and by Dokow and Holzman [3].

2 The Model

2.1 Notation and the Model

There is a set $N \equiv \{1, \dots, n\}$ of agents. The space of **actions** is denoted by (A, Σ, μ) , where A is the set of actions, Σ is the σ -algebra of subsets of actions, and μ is a measure on (A, Σ) . The space (A, Σ) is assumed to be isomorphic to $([0, 1], \mathcal{B})$, where such \mathcal{B} is the set of Borel subsets of $[0, 1]$. I assume that μ is countably additive, non-atomic, non-negative, and finite.⁵ Let $\mathcal{A} \equiv \{F \in \Sigma : \mu(F) > 0\}$ be the set of subsets of A of positive measure.

Let $\Omega \equiv \{\omega_1, \dots, \omega_k, \dots\}$ denote a finite or countable set of **signals**.⁶

A **reaction** $(\omega, \alpha) \in \Omega \times A$ is a pair of a signal and an action. Each individual has an opinion as to which reactions are reasonable.

A **view** of reasonableness is a mapping $R_i : \Omega \rightarrow \mathcal{A}$ from signals to subsets of A of positive measure. The requirement that the signals must map to subsets of positive measure reflects the idea that reasonableness is not perfection but a range of behavior. It must be possible for individuals to find the reasonable actions if they are to choose one. The collection of all views is denoted \mathcal{R} . For any two views $R_i, R'_i \in \mathcal{R}$, $R_i \sqsubset R'_i$ if $R_i(\omega) \subset R'_i(\omega)$ for all $\omega \in \Omega$.

For each $i \in N$ there exists an element $R_i \in \mathcal{R}$. A **profile** of views is a vector $R \in \mathcal{R}^n$. A reasonableness rule $f : \mathcal{R}^n \rightarrow \mathcal{R}$ is a mapping from a profiles to the **social view** of reasonableness, which will also be denoted R_0 .

2.2 Axioms

The first axiom, *Pareto*, requires the social view to consider a reaction unreasonable if it is not considered reasonable by any member of the society. This axiom excludes *degenerate*

⁵The space of actions is taken from the model of non-atomic games studied in [2] and [4].

⁶A signal can be thought of as description of the state of the world which precedes an action. Signals are verifiable.

rules, under which some reactions are deemed reasonable regardless of the opinions.⁷

Pareto: For any $(\omega, \alpha) \in \Omega \times A$ such that $\alpha \notin R_i(\omega)$ for all $i \in N$, $\alpha \notin R_0(\omega)$.

Consider two profiles which are identical except that, in the second profile, one individual changes her opinion and decides that additional reactions are reasonable. The second axiom, *monotonicity*, requires that any reaction considered reasonable by the social view in the first profile is also considered reasonable in the second. This axiom excludes *plurality* rules, under which, for each signal, the reactions with the highest number of supporters are deemed reasonable.

Monotonicity: If $R_i \sqsubset R_i^*$ for all $i \in N$, then $f(R) \sqsubset f(R^*)$.

The principle of *anonymity* requires all agents' views to be treated equally. Individuals' names are switched through a permutation π of N . For a given permutation, $\pi(i)$ is the new name of the individual formerly known as i . For a given profile R , $\pi R \equiv (R_{\pi(1)}, \dots, R_{\pi(n)})$ is the profile which results once names are switched. The third axiom, anonymity, requires that permutations of the agents' names do not affect whether certain reactions are deemed reasonable. This axiom excludes *dictatorships*, under which a pre-selected individual decides which reactions are reasonable.

Anonymity: For every permutation π of N , $f(R) = f(\pi R)$

The principle of *neutrality* is similar. It requires that a reasonableness rule not treat some actions differently from others on the basis of their names, but only on the basis of the views. Let Φ_μ be the set of all automorphisms of (A, Σ) which preserve the measure μ . Actions' names switched through an automorphism $\phi \in \Phi_\mu$. For a given profile R , $\phi R \equiv (\phi(R_1), \dots, \phi(R_n))$ is the profile where the actions' names are switched. This excludes rules which consider a particular reaction unreasonable regardless of the opinions.

Neutrality: For every automorphism $\phi \in \Phi_\mu$, $\phi(f(R)) = f(\phi R)$.

2.3 The Union Rule

Under the “union rule”, a reaction is considered reasonable if it is considered reasonable by at least one individual.

Union Rule: For every $\omega \in \Omega$, $\alpha \in R_0(\omega)$ if $\alpha \in R_i(\omega)$ for some $i \in N$.

⁷The examples provided in this section are not meant as an exhaustive list of all rules excluded by these axioms.

The union rule is the only reasonableness rule which satisfies all four axioms..

Theorem 2.1 *The union rule is the only reasonableness rule which satisfies Pareto, monotonicity, anonymity, and neutrality. Moreover, all four axioms are independent.*

Proof: Let $R \in \mathcal{R}^N$. By the definition of Pareto, for all $\omega \in \Omega$, if $\alpha \notin R_i(\omega)$ for all $i \in N$, then $\alpha \notin R_0(\omega)$. To prove the claim I must show that if $\alpha \in R_i(\omega)$ for some $i \in N$, then $\alpha \in R_0(\omega)$. Without loss of generality, suppose that $\hat{\alpha} \in R_1(\hat{\omega})$. Let $\varepsilon \equiv \min_{i \in N, \omega \in \Omega} \mu(R_i(\omega))$.

Let \tilde{R} be a profile such that: (1) $\hat{\alpha} \in \tilde{R}_1(\hat{\omega})$, (2) $\tilde{R}_i(\omega_k) \cap \tilde{R}_j(\omega_l) = \emptyset$ unless $i = j$ and $k = l$, (3) $\mu(\tilde{R}_i(\omega_k)) = \frac{\varepsilon}{2^{k+1}n}$ for all $i \in N$ and $\omega_k \in \Omega$, and (4) $\tilde{R}_i \sqsubset R_i$ for all $i \in N$.

Anonymity and neutrality imply that $\tilde{R}(\omega) = \cup_{i \in N} \tilde{R}_i(\omega)$ for all $\omega \in \Omega$.

To prove this, suppose, contrariwise, that $\hat{\alpha} \in \tilde{R}_1(\hat{\omega})$ but that $\hat{\alpha} \notin \tilde{R}_0(\hat{\omega})$. It follows from neutrality that $\tilde{R}_1(\hat{\omega}) \cap \tilde{R}_0(\hat{\omega}) = \emptyset$. From neutrality and anonymity it follows that, for all $i \in N$, $\tilde{R}_i(\hat{\omega}) \cap \tilde{R}_0(\hat{\omega}) = \emptyset$, which together with Pareto implies that $\tilde{R}_0(\hat{\omega}) = \emptyset$. But this is a contradiction, as $\{\emptyset\} \notin \mathcal{A}$.

Thus $\hat{\alpha} \in \tilde{R}_0(\hat{\omega})$. By monotonicity, that $\tilde{R}_i \sqsubset R_i$ for all $i \in N$ implies that $f(\tilde{R}) \sqsubset f(R)$, and therefore, $\hat{\alpha} \in R_0(\hat{\omega})$. This proves the claim.

The independence of the axioms is proved in the appendix. ■

3 Conclusion

I have introduced a new model of the “reasonable man” and other legal standards, and have shown that the union rule is the only rule to satisfy four standard axioms: Pareto, monotonicity, anonymity, and neutrality. If this model is applied to jury decisions, the union rule corresponds to the unanimity rule found in much of the United States.

3.1 Changing the number of alternatives

In this model the set of possible actions (A) is assumed to be uncountable. An alternative approach would be to change the model so that A is a finite set and $\mathcal{A} \equiv 2^A \setminus \emptyset$ is the set of non-empty subsets of A . The axioms would remain the same except that the μ -preserving automorphisms in the neutrality axiom would be replaced with ordinary permutations.

Theorem 2.1 would not hold in the finite case. The reason for this is that rules could be conditioned on the case where individuals each select a very small number of actions. For example, the rule which uses plurality rule when each individual selects a singleton

(for each ω) and the union rule in all other cases would satisfy the axioms. It would be possible to eliminate these special rules, however, with the introduction of a *replication* axiom which would require the result to be invariant to replications of the set of actions.

3.2 Fixed Quota Rules

Under a *fixed quota rule*, a reaction is deemed reasonable if and only if q or more individuals consider that reaction to be reasonable. A fixed quota rule corresponds to the jury rule where $n - q + 1$ jurors must agree to find liability for negligence.

Fixed Quota Rules: There is a fixed number $q \in [1, n]$, such that, for every $\omega \in \Omega$, $\alpha \in R_0(\omega)$ if $|\{i \in N : \alpha \in R_i(\omega)\}| \geq q$.

In the case where $q = 1$ this corresponds to the union rule. For the case $q > 1$, these rules are not well defined because it is possible that, for some signals, no two individuals agree that any particular actions are reasonable. In that case, the set of reasonable actions would be empty, and this violates the requirement that that set be of positive measure.

3.3 Reasonableness as a matter of law.

This paper is focused on understanding jury decisions about reasonableness “as a matter of fact” and not court decisions about reasonableness “as a matter of law”. In practice a jury may need to take the latter into account in the form of a pre-existing judicial decision which restricts the set of actions they are allowed to consider reasonable. It is possible to incorporate this into the model by allowing the relevant set of actions to change for each signal ω . Formally, this would require replacing the set of actions with a vector of sets $(A_\omega)_{\omega \in \Omega}$. While results do not generally transfer across these environments, Theorem 2.1 would remain unchanged.

Appendices

A Independence of the Axioms

Claim 1 *The Pareto, monotonicity, anonymity, and neutrality axioms are independent.*

Proof: I present four rules. Each violates one axiom while satisfying the remaining three. This is sufficient to prove the claim.

Rule 1: Consider the degenerate rule in which $R_0(\omega) = A$ for all $\omega \in \Omega$ and all $R \in \mathcal{R}^N$. This satisfies monotonicity, anonymity, and neutrality but violates Pareto.

Rule 2: Consider the rule in which $\alpha \in R_0(\omega)$ if $|\{i \in N : \alpha \in R_i(\omega)\}| \geq 2$ or if $|\{i \in N : \alpha \in R_i(\omega)\}| = 1$ and there is no $\alpha' \in A$ such that $|\{i \in N : \alpha' \in R_i(\omega)\}| \geq 2$. This satisfies Pareto, anonymity, and neutrality but violates monotonicity.

Rule 3: Consider the rule in which $R_0(\omega) = R_1(\omega)$ for all $\omega \in \Omega$ and all $R \in \mathcal{R}^N$. This satisfies Pareto, monotonicity, and neutrality but violates anonymity.

Rule 4: Let $\alpha^* \in A$. Consider the rule in which $R_0(\omega) = \bigcup_{i \in N} R_i(\omega) \cup \{\alpha^*\} \setminus \{\alpha^*\}$ for all $\omega \in \Omega$ and all $R \in \mathcal{R}^N$. This satisfies Pareto, monotonicity, and anonymity but not neutrality. ■

References

- [1] K. J. Arrow. *Social Choice and Individual Values*. Yale University Press, second edition, 1963.
- [2] R. J. Aumann and L. S. Shapley. *Values of Non-Atomic Games*. Princeton University Press, 1974.
- [3] E. Dokow and R. Holzman. Aggregation of binary opinion. *Working Paper*, 2005.
- [4] P. Dubey and A. Neyman. Payoffs in nonatomic economies: An axiomatic approach. *Econometrica*, 52:1129–1150, 1984.
- [5] L. A. Kornhauser and L. G. Sager. Unpacking the court. *The Yale Law Journal*, 96:82–117, 1986.
- [6] C. List and P. Pettit. Aggregating sets of judgments: An impossibility result. *Economics and Philosophy*, 18:89–110, 2002.
- [7] K. Nehring and C. Puppe. Consistent judgement aggregation: The truth-functional case. *Social Choice and Welfare*, forthcoming, 2007.
- [8] A. Rubinstein. The reasonable man – a social choice approach. *Theory and Decision*, 15:151–159, 1983.